

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

- 1) A method of generating code using components, each component corresponding to a respective data manipulation service, the method including:
 - a) Determining a combination of components that defines the code requirements; and,
 - 5 b) Implementing the component combination to thereby perform the defined sequence of data manipulations, such that the computer code is generated.
- 2) A method according to claim 1, at least some of the components including one or more ports for receiving and/or outputting data to be manipulated.
- 3) A method according to claim 2, each port having an agent adapted to control transfer of data to and
10 from the component.
- 4) A method according to claim 2 or claim 3, the method including having the component:
 - a) Receive data including a number of data portions;
 - b) Manipulate the data by:
 - 15 i) Adding data portions into the sequence at a predetermined location;
 - ii) Moving data portions from a first location to a second location within the sequence;
 - iii) Removing data portions from the sequence; and,
 - iv) Modifying data portions in the sequence.
- 5) A method according to claim 4, at least a portion of the method being performed using a processing system including a store, the method including storing one or more of the data portions in the store.
- 20 6) A method according to any one of the claims 1 to 5, at least some of the components being formed from a number of combined sub-components, the sub-components also being components.
- 7) A method according to any one of the claims 1 to 6, at least some of the components being formed using at least one of:
 - a) Manual manipulation of the data by an individual;
 - 25 b) Computer code adapted to be executed by a processing system, to thereby manipulate of the data automatically; and,
 - c) Combinations of sub-components, the sub-components also being components.
- 8) A method according to any one of the claims 1 to 7, the method being performed using one or more processing systems.
- 30 9) A method according to claim 8, the method including causing a first processing system to:
 - a) Select a number of components in response to input commands received from a user;
 - b) Define the component combination using the selected components; and,
 - c) Cause the component combination to be implemented such that the defined sequence of data manipulations is performed.

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- 10) A method according to claim 9, at least some of the components including one or more ports, the method including causing the processing system to:
- a) Provide an indication of the ports of each selected component to the user; and,
 - b) Interconnect selected ones of the ports in response to input commands from the user to thereby
5 define the component combination.
- 11) A method according to any one of the claims 8 to 10, the method including causing a second processing system to:
- a) Determine details of a number of components;
 - b) Provide at least an indication of the details to the user via the first processing system.
- 10 12) A method according to claim 12, the method including causing the processing system to:
- a) Select respective ones of the components in response to input commands from the user; and,
 - b) Provide the details of the selected components to the user via the first processing system.
- 13) A method according to claim 12, the details being component specifications, the processing system including:
- 15 a) A store for storing the component specifications including at least one of:
 - i) An indication of the manipulation service;
 - ii) A graphical representation of the component; and,
 - iii) Port specifications defining the operation of the agents associated with each port; and,
 - b) A processor, the method including causing the processor to:
 - 20 i) Obtain one or more component specifications from the store; and,
 - ii) Provide the component specifications to the user via the first processing system.
- 14) A method according to any one of the claims 9 to 13, the method including causing the first processing system to:
- a) Generate a graphical representation of the one or more selected components; and,
 - 25 b) Manipulate the graphical representation in response to input commands received from a user to thereby define the component combination.
- 15) A method according to any one of the claims 9 to 14, the first processing system being coupled to one or more component processing systems via a communications network, each component processing system being adapted to implement one or more respective components, the method including:
- 30 a) Generating an service request for each component in the component combination; and,
 - b) Transferring the service request to each entity via the communications network, each entity being adapted to respond to the service request to implement the data manipulation embodied by the respective component.
- 16) A method according to claim 15, the method including:

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- a) Determining any data required by the components; and,
 - b) Providing the data in the service request.
- 17) A method according to claim 15 or claim 16, each service request including an indication of the interconnections for each of the ports of the respective component.
- 5 18) A method according to claim 17, the method including causing each component processing system to:
- a) Implement one or more respective component instances in accordance with the received service request; and,
 - b) Cause each component instance to:
 - 10 i) Interact with other components in accordance with the interconnections defined in the service request; and,
 - ii) Perform any required data manipulations.
- 19) A method according to claim 17 or claim 18, the method including causing each component processing system to:
- a) Implement a respective agent associated with each port; and,
 - 15 b) Cause each agent to cooperate with an agent of another component in accordance with the defined interconnections, to thereby allow data to be transferred between the ports.
- 20) A method according to claim 11, the method including causing the second processing system to:
- a) Determine performance information, the performance information being representative of one or more criteria regarding the implementation of the components;
 - 20 b) Provide the performance information to a user, the user selecting the components in accordance with the performance information.
- 21) A method according to claim 20, the performance information including at least one of:
- a) An indication of the entity implementing the component;
 - b) An indication of the geographical location of the entity;
 - 25 c) An indication of the duration for implementing the component;
 - d) An indication of a cost associated with implementing the respective component; and,
 - e) A rating, the rating being indicative of the success of the component.
- 22) A method according to claim 20 or claim 21, the method including:
- a) Providing a number of different components for performing equivalent services, the different components being provided by different entities; and,
 - 30 b) Inducing competition between the entities to thereby drive improvement of the components.
- 23) A method according to any one of the claims 20 to 22, the method including generating revenue by charging a cost for the use of each component.
- 24) A method according to claim 23, the including:

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- a) Providing at least some of the revenue to a respective entity implementing the component; and,
 - b) Having the operator of the second processing system retain at least some of the revenue.
- 25) A method according to any one of the claims 1 to 24, the method including causing the generated code to be context dependent.
- 5 26) A method according to claim 25, the method causing at least some of the components to:
- a) Determine a context for the code; and,
 - b) Perform the data manipulation service in accordance with the determined context such that the performed data manipulation is dependent on the context.
- 27) A method according to claim 26, the processing system including at least a memory, stack and
- 10 registers, the context including at least one of:
- a) The state of at least one of the registers, stack and memory;
 - b) Other components in the defined component combination; and,
 - c) Random factors.
- 28) A method according to claim 26 or claim 27, the method including making the data manipulation
- 15 context dependent by at least one of:
- a) Dithering;
 - b) Meshing; and,
 - c) Obscuring.
- 29) Apparatus for generating computer code using components, each component corresponding to a
- 20 respective service for manipulating data in a predetermined manner, the apparatus including one or more processing systems adapted to:
- a) Define a combination of components corresponding to a sequence of data manipulations; and,
 - b) Implement the component combination to thereby perform the defined sequence of data manipulations, such that the computer code is generated.
- 25 30) Apparatus according to claim 29, the apparatus including:
- a) One or more component processing systems, each component processing system being adapted to implement a respective component; and,
 - b) A first processing system, the first processing system being adapted to:
 - i) Define the component combination in accordance with input commands received from a user;
- 30 and,
- ii) Determine the component processing systems implementing the respective components; and
 - iii) Transfer service requests to each of the determined component processing systems.
- 31) Apparatus according to claim 30, the component processing system being adapted to:
- a) Receive the service request;

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- b) Generate a respective component instance; and,
 - c) Perform the service using the respective component instance.
- 32) Apparatus according to any one of the claims 29 to 31, the apparatus including a second processing system, the second processing system being adapted to store details of available components.
- 5 33) Apparatus according to claim 32, the second processing system being adapted to obtain the details of a component from a respective component processing system.
- 34) Apparatus according to claim 32 or claim 33, the first processing system being adapted to cooperate with the second processing system to thereby allow a user to:
- a) Select one or more of the available components; and
 - 10 b) Define the component combination.
- 35) Apparatus according to any one of the claims 29 to 34, the apparatus being adapted to perform the method of any one of the claims 1 to 28.
- 36) A computer program product for generating computer code using components, each component corresponding to a respective service for manipulating data in a predetermined manner, the computer
- 15 program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of one of the claims 1 to 28.
- 37) A method of allowing users to manipulate data, the method including using one or more processing systems to:
- a) Store details of a number of components, each component representing a respective data
 - 20 manipulation service implemented by a respective entity; and,
 - b) Provide details of selected components to users, thereby allowing the users to define a component combination defining a sequence of data manipulation services for manipulating the data.
- 38) A method according to claim 37, the method including:
- a) For each component, receiving a component specification from a respective entity; and,
 - 25 b) Providing the details in accordance with the component specification.
- 39) A method according to claim 38, the method including causing the processing system to:
- a) Determine performance information representative of one or more criteria regarding the implementation of the components; and,
 - b) Provide the performance information to a user, the user selecting the components in accordance
 - 30 with the performance information.
- 40) A method according to claim 39, the performance information including at least one of:
- a) An indication of the entity implementing the component;
 - b) An indication of the geographical location of the entity;
 - c) An indication of the duration for implementing the component;

d) An indication of a cost associated with implementing the respective component; and,

e) A rating, the rating being indicative of the success of the component.

41) A method according to claim 39 or claim 40, the method including:

a) Providing a number of different components for performing equivalent services, the different components being provided by different entities; and,

b) Inducing competition between the entities to thereby drive improvement of the components.

42) A method according to any one of the claims 38 to 41, the method including generating revenue by charging a cost for the use of each component.

43) A method according to claim 42, the method including providing at least a portion of the fee to the respective entity.

44) A method according to any one of the claims 38 to 43, the method including using a processing system coupled to a number of end stations via a communications network, the method including allowing users to select components and define a component combination using the end stations.

45) A method according to claim 44, the processing system including a store and a processor, the method including:

i) Storing component specifications in the store; and,

ii) Providing the component specifications to the user via the end station, thereby allowing the user to define a component combination and implement the required data manipulation services.

46) Apparatus for allowing users to manipulate data, the apparatus including one or more processing systems adapted to:

a) Store details of a number of components, each component representing a respective data manipulation service implemented by a respective entity;

b) Provide details of selected components to users, thereby allowing the users to define a component combination defining a sequence of data manipulation services for manipulating the data.

47) Apparatus according to claim 46, the apparatus being adapted to perform the method of any one of the claims 38 to 45.

48) A computer program product for allowing users to manipulate data, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of any one of the claims 38 to 45.

49) A method of providing a component embodying a data manipulation service using a processing system, the method including:

a) Determining a data manipulation service to be performed;

b) Determining a method of performing the data manipulation service; and,

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- c) Generating a component specification defining the data manipulation service, the component specification including ports specifications representing ports used for receiving or outputting data.
- 5 50) A method according to claim 49, the method including further determining a private component specification defining the method of performing the data manipulation service.
- 51) A method according to claim 49 or claim 50, the method including providing the component specification to a processing system, the processing system being adapted to provide details of the component to users thereby allowing users to select the component for use in data manipulation service.
- 10 52) A method according to any one of the claims 49 to 51, the method including defining a component server to be implemented by the processing system, the component server being adapted to generate component instances for:
- a) Receiving the data to be manipulated;
 - b) Manipulating the data; and,
 - 15 c) Outputting the manipulated data.
- 53) A method according to claim 52, the method including defining a respective agent for each port, the agent being adapted to cooperate with agents of other components to thereby allow data to be received at and output from the ports.
- 54) A method according to claim 53, each agent being formed from respective code adapted to be
- 20 executed by the component server.
- 55) A method according to any one of the claims 52 to 54, the method including defining the component to thereby cause the data to be manipulated by least one of:
- a) Manually in accordance with user inputs; and,
 - b) Automatically by the component server.
- 25 56) A method according to claim 55, the method including causing the data manipulation to be context dependent by:
- a) Causing at least one of the agents to determine an indication of the context; and,
 - b) Manipulating the data in accordance with the content.
- 57) A method according to claim 56, the method including making the data manipulation by at least one
- 30 of:
- a) Dithering;
 - b) Meshing; and,
 - c) Obscuring.

- 58) A method according to any one of the claims 49 to 57, the method including determining a method of performing the data manipulation service by defining a combination of other components corresponding to a sequence of data manipulations.
- 59) A method according to claim 58, the method including using a processing system to:
- 5 a) Select one or more components;
- b) Define the component combination; and,
- c) Generate the component specification in accordance with the defined component combination.
- 60) A method according to claim 58 or claim 59, the component being provided by an entity, the other components being provided by different entities.
- 10 61) Apparatus for providing a component embodying a data manipulation service, the apparatus including a processing system adapted to:
- a) Determine in accordance with user input commands:
- i) A data manipulation service to be performed;
- ii) A method of performing the data manipulation service; and,
- 15 b) Generating a component specification defining the data manipulation service, the component specification including ports specifications representing ports used for receiving or outputting data.
- 62) Apparatus according to claim 61, the apparatus being adapted to perform the method of any one of the claims 55 to 66.
- 20 63) A computer program product for providing a component embodying a data manipulation service, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of any one of the claims 49 to 60.
- 64) A method of providing a service embodied in a component using a processing system, the method including causing the processing system to:
- 25 a) Receive a service request;
- b) Generate a respective component instance in response to the received service request;
- c) Receive data to be manipulated;
- d) Manipulate the data using the respective component instance; and,
- e) Supply the manipulated data to an output.
- 30 65) A method according to claim 64, the method including causing the processing system to manipulate the data in accordance with at least one of:
- a) A predetermined process; and,
- b) Input commands received from an operator;

- 66) A method according to claim 64 or claim 65, the method including causing the processing system to generate an agent associated with each input and output of the component, the agent being adapted to cooperate with agents of other components to thereby allow data to be received at the input and output from the outputs.
- 5 67) A method according to claim 66, the method including:
- a) Determining connections with other components from the service request; and,
 - b) Causing the agents to cooperate with agents of other components in accordance with the determined connections.
- 10 68) A method according to claim 67, the processing system being coupled to one or more component processing systems via a communications network, each component processing system being adapted to implement a respective component, the method including:
- a) Determining a connection address for each agent from the service request, the connection address corresponding to an address of agents located on component processing systems;
 - b) Causing the agent to cooperate with the other agent in accordance with the determined connection address.
- 15 69) A method according to any one of the claims 64 to 68, the method of manipulating the data including:
- a) Defining a combination of other components corresponding to a sequence of data manipulations; and,
 - b) Implementing the component combination.
- 20 70) A method according to claim 69, the processing system being coupled to one or more component processing systems via a communications network, each component processing system being adapted to implement a respective component, the method including causing the processing system to:
- a) Generate one or more service requests in accordance with the defined component combination;
 - b) Transferring the service request to each component processing system via the communications network, thereby causing each component to be implemented.
- 25 71) A method according to any one of the claims 64 to 70, the method including:
- a) Determining a context for the performance of the service; and,
 - b) Manipulating the data in accordance with the content, to thereby make the data manipulation context dependent.
- 30 72) A method according to claim 71, the data manipulation including generating computer code, the code being adapted to be implemented by a processing system having a memory, stack and registers, the context including at least one of:
- a) The state of at least one of the registers, stack and memory;
 - b) Other components in the defined component combination; and,

c) Random factors.

73) A method according to claim 71 or claim 72, the method including making the data manipulation by at least one of:

- a) Dithering;
- b) Meshing; and,
- c) Obscuring.

74) Apparatus for providing a service embodied in a component, the apparatus including a processing system adapted to:

- a) Receive a request for the provision of the service;
- b) Generate a respective component instance in response to the received request;
- c) Receive data to be manipulated;
- d) Manipulate the data with the respective component instance; and,
- e) Supply the manipulated data to an output.

75) Apparatus according to claim 80, the apparatus being adapted to perform the method of any one of the claims 69 to 73.

76) A computer program product for providing a service embodied in a component, each component corresponding to a respective service for manipulating data, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of any one of the claims 64 to 73.

77) A method of manipulating data by implementing a defined combination of components, each component corresponding to a respective service for manipulating data, the method including:

- a) Determining from the component combination:
 - i) The components to be implemented;
 - ii) Connections between ports of respective ones of the components;
 - iii) Any data required by the components;
- b) For each component:
 - i) Generate a service request, requesting the provision of the respective service;
 - ii) Transfer the service request to an entity implementing the respective component, the entity being responsive to the service request to perform the respective service thereby allowing the data manipulations to be performed.

78) A method according to claim 77, the method including using a processing system, the method including causing the processing system to:

- a) Generate a component server;
- b) Cause the component server to:

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- i) Implement a component instance corresponding to the defined component combination;
- ii) Generate the service requests;
- iii) Generate agents associated with any ports of the component instance; and,
- iv) Cause the agents to cooperate with agents of other components in accordance with the defined connections, to thereby allow data to be transferred between ports of the components.

79) A method according to claim 77 or claim 78, the processing system being coupled to one or more component processing systems via a communications network, each component processing system being adapted to implement a respective component, the method including:

- a) Determining a connection address for each agent of each component in accordance with the defined component combination, the connection address corresponding to an address of agents located on component processing systems;
- b) Generating the service request including:
 - i) Any required data; and,
 - ii) An indication of a connection address for each agent.

80) A method according to claim 85, the processing system including a store for storing component specifications, the method including determining the connection address in accordance with the component specifications.

81) Apparatus for manipulating data by implementing a defined combination of components, each component corresponding to a respective service for manipulating data, the apparatus including a processing system adapted to:

- a) Determine from the component combination:
 - i) The components to be implemented;
 - ii) Connections between ports of respective ones of the components;
 - iii) Any data required by the components;
- b) For each component:
 - i) Generate a service request, requesting the provision of the respective service;
 - ii) Transfer the service request to an entity implementing the respective component, the entity being responsive to the request to perform the respective service thereby allowing the data manipulations to be performed.

82) Apparatus according to claim 81, the apparatus being adapted to perform the method of any one of the claims 77 to 80.

83) A computer program product for manipulating data by implementing a defined combination of components, each component corresponding to a respective service for manipulating data, the

computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of any one of the claims 87 to 80.

84) A method of defining a component combination using a processing system, each component representing a respective service for manipulating data, the method including:

- a) Selecting one or more components to be combined; and,
- b) Causing the processing system to:
 - i) Generate a graphical representation of each selected component on a display; and,
 - ii) Manipulate the graphical representation to define connections between ports of the components.

85) A method according to claim 84, the method further including causing the processing system to generate:

- a) Component data representing the components in the representation.
- b) Connection data representing the connections between the components.

86) A method according to claim 84 or claim 85, the method including:

- a) Causing the processing system to generate a representation of a root component; and,
- b) Defining connections between any ports of the root component and ports of the components.

87) A method according to any one of the claims 84 to 86, the method including causing the processing system to manipulate the graphical representation to display sub-components associated with any one of the root components.

88) A method according to any one of the claims 84 to 87, the method including causing the processing system to manipulate the graphical representation in response to input commands from the user.

89) Apparatus for combining components, each component representing a respective service for manipulating data, the apparatus including a processing system adapted to:

- a) Select one or more components to be combined;
- b) Generate a graphical representation of each selected component on a display; and,
- c) Manipulate the graphical representation to define connections between ports of the components.

90) Apparatus according to claim 89, the apparatus being adapted to perform the method of any one of the claims 84 to 88.

91) A computer program product for combining components using a processing system, each component representing a respective service for manipulating data, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of an one of the claims 84 to 88.

92) A method of performing context dependent data manipulations, the method including:

- a) Determining a number of techniques for performing a desired data manipulation;

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- b) Defining a component embodying each of the determined techniques; and,
- c) In use, performing a selected one of the techniques in accordance with the context, such that the resulting manipulated data is dependent on the context.

93) A method according to claim 92, the method including:

- a) Determining the context;
- b) Selecting one of the number of techniques in accordance with the context; and,
- c) Performing the data manipulations.

94) A method according to claim 93, the method including:

- a) Receiving a service request requesting the implementation of the service embodied by the component; and,
- b) Determining the context from the service request.

95) A method according to claim 93 or claim 94, the component being implemented as part of a component combination defining a sequence of data manipulations, the method including determining the context from other components in the component combination.

96) A method according to claim 95, the method including providing an agent associated with each port of the component, the agents being adapted to cooperate with agents of other components in accordance with connections defined in the component combination to thereby allow data to be transferred between the ports of the components, the method including causing one of the agents to receive a context indication from another component.

97) A method according to any one of the claims 92 to 96, the data manipulation being used in generating computer code adapted to be executed by a processing system having a memory, stack and registers, the context including the state of at least one of:

- a) The registers;
- b) The stack;
- c) The memory; and,
- d) Code location.

98) A method according to any one of the claims 98 to 103, the method including determining a random variable, and selecting one or the techniques in accordance with the random variable.

99) A method according to any one of the claims 98 to 104, the component being implemented as part of a component combination defining a sequence of data manipulations, each of the components being implemented by respective entities, the data manipulation including a number of data manipulation steps, the method including negotiating with one or more other entities, to thereby cause one or more of the data manipulation steps to be performed by the other entities.

100) Apparatus for performing context dependent data manipulations, the apparatus including a processing system adapted to:

- a) Determine a number of techniques for performing a desired data manipulation;
- b) Define a component embodying each of the determined techniques; and,
- 5 c) Perform a selected one of the techniques in accordance with the context, such that the resulting manipulated data is dependent on the context.

101) Apparatus according to claim 100, the processing system being adapted to perform the method of any one of the claims 92 to 99.

102) A computer program product for performing context dependent data manipulations using a processing system, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of an one of the claims 92 to 99.

103) A method of implementing an agent for use in component based data manipulation, the method including:

- 15 a) Receiving an agent indication;
- b) Generating an agent; and,
- c) Causing the agent to establish a connection with another agent in accordance with the agent indication.

104) A method according to claim 103, the agents being associated with ports of the components, the method including:

- 20 a) Causing the agents to cooperate to determine a data type; and,
- b) Causing the data to be transferred between the ports in accordance with the determined data type.

105) A method according to claim 104, each agent having an associated agent specification defining the respective data types that can be handled, the method including:

- 25 a) Comparing the agent specifications; and,
- b) Determining the data type in response to a successful comparison.

106) A method according to claim 105, the agent being implemented by a respective component processing system coupled to one or more other component processing systems for implementing respective components via a communications network, the agent indication being in the form of a network address.

107) A method according to claim 105, the method including:

- a) Receiving first and second agent indications requesting connection of the agent to respective first and second other agents;

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- b) Causing the agent to provide the first and second agent indications to the second and first agents respectively, thereby causing the first and second other agents to interconnect.

108) A method according to claim 107, the method including:

- a) Receiving the first agent indication;
- 5 b) Connecting the agent to the first other agent;
- c) Receiving the second agent indication;
- d) Generating a temporary agent;
- e) Connecting the temporary agent to the second other agent;
- f) Allowing the first and second other agents to connect by:
 - 10 i) Transferring the first agent indication from the temporary agent to the second other agent;
 - ii) Transferring the second agent indication from the agent to the first other agent; and,
- g) Terminating the agent and the temporary agent.

109) A method according to any one of the claims 103 to 108, each agent being associated with a respective component, the method including implementing the agent using a component processing
15 system.

110) A method according to claim 109, the method including causing the component processing system to:

- a) Generate a component server for implementing a respective component instance; and,
- b) Causing the component server to implement the agent.

20 111) A method according to claim 110, the processing system being coupled to one or more other processing systems via a communications network, method including:

- a) Generating a component instance in accordance with a received service request, the service request including the agent indication in the form of a network address;
- b) Generating any agents associated with the component instance; and,
- 25 c) Causing the agents to connect to any other agents in accordance with the respective network address.

112) A method according to any one of the claims 103 to 111, the method including causing the agent to:

- a) Receive data via the connection with another agent;
- 30 b) Determine a schematic in accordance with the received data, the schematic being used to implement the component.

113) A method according to any one of the claims 103 to 112, the method including generating an agent header and an agent payload, the agent header including routing information to allow the agent

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to be transferred to another component to thereby establish a connection, the payload including the data to be transferred.

114) Apparatus for implementing an agent for use in component based data manipulation, the apparatus including a processing system for:

- a) Receiving an agent indication;
- b) Generate an agent; and,
- c) Cause the agent to establish a connection with another agent in accordance with the agent indication.

115) Apparatus according to claim 114, the processing system being adapted to perform the method of any one of the claims 103 to 113.

116) A computer program product for implementing an agent for use in component based data manipulation, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of an one of the claims 103 to 113.

117) A method of providing a dynamic component for providing data manipulation services, the method including:

- a) Determining a service to be performed;
- b) Determining at least two methods of performing the service;
- c) Determining a method of selecting one of the methods in accordance with received data; and,
- d) Generating a component specification defining a component embodying the data manipulation service.

118) A method according to claim 117, the methods of performing the service utilising respective components, the method including:

- a) Selecting components to implement the desired services;
- b) Defining a component schematic including at least:
 - i) A first schematic portion representing any common portion of each method of performing the services;
 - ii) At least two second schematic portions representing any different portion of each method of performing the services;
 - iii) A selector agent for selecting a respective one of the second schematic portions.

119) A method according to claim 118, the method including defining an agent associated with each input or output, the agent being adapted to cooperate with an agent of another component in accordance with the defined interconnections, to thereby allow data to be transferred between the ports of the components.

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- 120) Apparatus for providing a dynamic component for providing data manipulation services, the apparatus including a processing system for:
- a) Determining a service to be performed;
 - b) Determining at least two methods of performing the service;
 - 5 c) Determining a method of selecting one of the methods in accordance with received data; and,
 - d) Generating a component specification defining a component embodying the data manipulation service.
- 121) Apparatus according to claim 120, the processing system being adapted to perform the method of any one of the claims 117 to 119.
- 10 122) A computer program product for providing a dynamic component for providing data manipulation services, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of an one of the claims 117 to 119.
- 123) A method of providing a service embodied in a dynamic component using a processing system, the method including causing the processing system to:
- 15 a) Receive a service request;
 - b) Generate a respective component instance in response to the received service request;
 - c) Receive data to be manipulated;
 - d) Select a method of manipulating the data in accordance with the received data;
 - 20 e) Manipulate the data using the respective component instance; and,
 - f) Supply the manipulated data to an output.
- 124) A method according to claim 123, the component including a number of agents, the method including causing the processing system to generate an agent associated with each input and output of the component, the agent being adapted to cooperate with agents of other components to thereby
- 25 allowing data to be received at the input and output from the outputs.
- 125) A method according to claim 124, the method including:
- a) Determining connections with other components from the service request; and,
 - b) Causing the agents to cooperate with agents of other components in accordance with the determined connections.
- 30 126) A method according to claim 124 or 125, the component instance being defined by a component schematic including at least:
- a) A first schematic portion representing any common portion of each method of performing the services;

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- b) At least two second schematic portions representing any different portion of each method of performing the services;
- c) A selector agent for selecting a respective one of the second schematic portions, the method including:
 - 5 i) Implementing at least some of the first schematic portion;
 - ii) Causing the selector agent to select one of the second schematic portions; and.
 - iii) Implementing the remainder of the schematic portions.
- 127) A method according to claim 128, the processing system being coupled to one or more component processing systems via a communications network, each component processing system being adapted
10 to implement a respective component, the method including:
 - a) Generate one or more service requests in accordance with the defined component combination; and,
 - b) Transferring the service request to each component processing system via the communications network, thereby causing each component to be implemented.
- 15 128) Apparatus for providing a service embodied in a dynamic component using a processing system, the processing system being adapted to:
 - a) Receive a service request;
 - b) Generate a respective component instance in response to the received service request;
 - c) Receive data to be manipulated;
 - 20 d) Select a method of manipulating the data in accordance with the received data;
 - e) Manipulate the data using the respective component instance; and,
 - f) Supply the manipulated data to an output.
- 129) Apparatus according to claim 128, the processing system being adapted to perform the method of any one of the claims 123 to 127.
- 25 130) A computer program product for providing a service embodied in a dynamic component using a processing system, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of an one of the claims 123 to 127.
- 131) A method of providing connections for a number of agents between two respective components in
30 a component based data manipulation scheme, the method including:
 - a) Providing a bundling sub-component in each component; and,
 - b) Defining a connection between:
 - i) First agents of the bundling sub-component and respective agents of the respective component; and,

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ii) A second agent of each bundling sub-component.

132) A method according to claim 137, the method including:

- a) Causing the agents to establish defined connections in accordance with the defined connections;
 - b) Causing the second agents to exchange details of the number of agents of the two components;
- and,

- c) Causing the agents of the two components to interconnect in accordance with the exchanged details.

133) A method according to claim 132, each agent having a respective address, the method including:

- a) Providing each bundling sub-component with the addresses of the number of agents of the respective component and the address of the second agent of the other bundling sub-component;
- b) Causing the first agents of each bundling sub-component to connect to the number of agents of the respective component and the second agent of the other bundling sub-component in accordance with the respective agent addresses;
- c) Causing the second agents to exchange addresses of the first agents;
- d) Generating temporary first agents associated with each first agent;
- e) Interconnecting the temporary first agents in accordance with the exchanged addresses;
- f) Causing the first agents and temporary first agents to exchange the addresses of the number of agents on each component; and,
- g) Causing the number of agents to connect in accordance with the exchanged addresses.

134) A method according to claim 132, the method of bundling the agents, including causing the first bundling component to:

- a) Obtain a message including a payload and header from each agent;
- b) Extract the payload from each message;
- c) Concatenate the payloads; and,
- d) Generate a message including the concatenated payload and a header based on the headers of the received message.

135) A method according to claim 134, the method of debundling the agents, including causing the second bundling component to:

- a) Obtain a message including a payload and header from the bundling component;
- b) Extract the payload from the message;
- c) De-concatenate the payload into a number of payloads; and,
- d) Generate a respective message for each of the number of agents, each message including a respective payload and a header based on the header of the received message.

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- 136) A method according to any one of the claims 131 to 135, the method including arranging bundling components in sequence to thereby define a hierarchical bundle.
- 137) A method according to claim 136, the method including placing bundling components in series to thereby defining different levels in the bundle.
- 5 138) A method according to claim 136, the method including placing bundling components in parallel to thereby define groups of agents within a level of the hierarchy.
- 139) Apparatus for providing connections for a number of agents between two respective components in a component based data manipulation scheme using a processing system, the processing system being adapted to:
- 10 a) Providing a bundling sub-component in each component; and,
b) Interconnecting:
i) An bundling component agent to each agent of the number of agents in the respective component;
ii) A respective agent for on each bundling sub-component.
- 15 140) Apparatus according to claim 149, the processing system being adapted to perform the method of any one of the claims 131 to 138.
- 141) A computer program product for providing connections for a number of agents between two respective components in a component based data manipulation scheme using a processing system, the computer program product including computer code which when executed on a suitable
20 processing system causes the processing system to perform the method of an one of the claims 131 to 138.
- 142) A method of constructing code using a root processing system and a number of component processing systems, each component processing system being adapted to implement a respective component defined in a schematic, the method including:
- 25 a) Causing the root processing system to generate an agent including a payload;
b) Transferring the agent to a number of components in sequence from a last component to a first component;
c) Causing the first component to interact with the agent to provide data in the payload;
d) Transferring the agent from the first component to the next component;
30 e) Causing the next component to interact with the agent to provide data in the payload;
f) Repeating steps (d) and (e) until the last component has interacted with the payload; and,
g) Transferring the agent to the root processing system, to thereby provide code.
- 143) A method according to claim 142, the method including further components to interact with one or more of the components to provide data thereto.

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- 144) A method according to claim 142 or claim 143, the agent being a bundle of agents, the method including:
- a) Providing bundling components;
 - b) Optionally transferring the agent bundle to the bundling components in accordance with the defined component schematic;
 - c) Selectively unbundling the bundle; and,
 - d) Transferring selected ones of the agents to the components, to thereby allowing the components to interact with the respective agents.
- 145) A method according to claim 144, the agent bundle being a hierarchical bundle.
- 146) A method according to claim 144 or claim 145, the agents in the bundle representing different portions of the code, the method including:
- a) Receiving the bundle at the root processing system; and,
 - b) Extracting the data from the payload to thereby form the code.
- 147) Apparatus for constructing code, the apparatus including a root processing system and a number of component processing systems, each component processing system being adapted to implement a respective component defined in a schematic, apparatus being adapted to perform the method of any one of the claims 142 to 146.
- 148) A computer program product for constructing code in accordance with a schematic using a processing system, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of an one of the claims 142 to 146.
- 149) A method of allowing users to manipulate data, the method including:
- a) Providing details of a number of components, each component representing a respective data manipulation service implemented by a respective entity;
 - b) Allowing users to define a component combination defining a sequence of data manipulation services; and,
 - c) Causing the data manipulation services to be performed in accordance with the defined combination.
- 150) A method according to claim 149, the method including:
- a) Allowing users to select components; and,
 - b) Providing users with a component specification for each selected component, each component specification defining the data manipulation service and port specifications defining the data to be received at or output from respective ports.

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- 151) A method according to claim 150, the method including obtaining the component specification for a respective component from an entity implementing the component.
- 152) A method according to claim 150 or claim 151, the method being implemented using one or more processing systems coupled to a user end station via a communications network, the method
5 including:
- a) Allowing the user to select the components using the end station; and,
 - b) Transferring the component specifications to the end station from one or more of the processing systems.
- 153) A method according to any one of the claims 150 to claim 152, the method including allowing
10 users to select the components in accordance with performance information including at least one of:
- a) An indication of the entity implementing the component;
 - b) An indication of the geographical location of the entity;
 - c) An indication of the duration for implementing the component;
 - d) An indication of a cost associated with implementing the respective component; and,
 - 15 e) A rating, the rating being indicative of the success of the component.
- 154) A method according to any one of the claims 150 to claim 153, the method including:
- a) Causing the end station to generate service requests in accordance with the component combination; and,
 - b) Transferring the service request to entity processing systems thereby causing the entity processing
20 systems to perform the data manipulation defined by the component.
- 155) A method according to claim 154, the component combination defining connections between the components, the service requests including connection information determined by the end station from the component specifications.
- 156) A method according to claim 155, the method including causing the component processing
25 systems to:
- a) Generate one or more component instances in accordance with the received service request;
 - b) Cause each component instance to:
 - i) Cooperate with other components to send and/or receive data; and,
 - ii) Perform the required data manipulation service.
- 30 157) Apparatus for allowing users to manipulate data, the apparatus including a system for:
- a) Providing details of a number of components, each component representing a respective data manipulation service implemented by a respective entity;
 - b) Allowing users to define a component combination defining a sequence of data manipulation services; and,

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c) Causing the data manipulation services to be performed in accordance with the defined combination.

158) Apparatus according to claim 157, the apparatus being adapted to perform the method of any one of the claims 150 to 156.

5 159) A computer program product for allowing users to manipulate data, the computer program product including computer code which when executed on a suitable processing system causes the processing system to perform the method of an one of the claims 150 to 156.